

# STRUCTURAL MODELS IN CONSUMER CREDIT

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## ABSTRACT

We propose a structural credit risk model for consumer lending using option theory and the concept of the value of the consumer's reputation. Using some assumptions, we proposed an option-based reasoning for the process of default in consumer credit that is similar to Merton's approach for corporate credit. The consumer has a call option on his reputation with a strike price equal to the value of the consumer's debt under consideration. If the value of his reputation is lower than the value of this debt, the consumer will default. The lending institution will report the non-payment to the credit agencies or credit bureaus that will make it public to all the market. The consumer will lose the residual value of his reputation and access to credit. On the other hand, if the value of his reputation is greater than the value of the debt, then it is worth the consumer paying off the debt and keeping his reputation.

Using Brazilian empirical data and a credit bureau score as proxy for creditworthiness we compare a number of alternative models for the stochastic behavior of the creditworthiness proxy. Using a general default barrier for all the expositions of a portfolio we show that best results for default prediction are obtained with a simple diffusion model for creditworthiness, leading to a simple

analytical solution for the probability of default. We show that this approach for default prediction can add significant predictive power to the traditional approach based on behavioural scoring models.

We apply the proposed model to portfolios of consumer loans introducing a factor to account for the mean influence of systemic economic factors on individuals. This results in a hybrid structural-reduced-form model. We compare results obtained by the proposed model with the ones obtained using Vasicek's model that is the basis of the Basel II formula for capital requirement. Our conclusions partially support Basel II approach for modelling the credit risk of portfolios of retail credit in the sense that, by finding that the simple diffusion models are adequate for consumer credit modelling, it supports the use of a diffusion based structural model like Vasicek model for retail portfolio modelling. Moreover some of the assumptions of the Vasicek model – large numbers of relatively small and equal loans – seem to be more plausible for retail credit than for corporate credit.